

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Barker et al.	
Serial No.:	Group Art Unit:
Filed:	Examiner:
Title: HIGH DENSITY STORAGE OF EXCITED POSITRONIUM USING PHOTONIC BANDGAP TRAPS	
Attorney Docket No.: 02W102	

Commissioner for Patents  
Washington, D.C. 20231

**INFORMATION DISCLOSURE STATEMENT**

Dear Sir:

This Information Disclosure Statement is submitted:

under 37 CFR 1.97(b), or  
(Within three months of filing national application; or date of entry of international application; or before mailing date of first office action on the merits; whichever occurs last)

under 37 CFR 1.97(c) together with either a:  
 Statement under 37 CFR 1.97(e), or  
 a \$180.00 fee under 37 CFR 1.17(p), or  
(After the CFR 1.97(b) time period, but before final action or notice of allowance, whichever occurs first)

under 37 CFR 1.97(d) together with a:  
 Statement under 37 CFR 1.97(e), and  
 a \$180.00 fee set forth in 37 CFR 1.17(p).  
(Filed after final action or notice of allowance, whichever occurs first, but before payment of the issue fee)

Applicant(s) submit herewith Form PTO 1449-Information Disclosure Citation together with copies, of patents, publications or other information of which applicant(s) are aware, which applicant(s) believe(s) may be material to the examination of this application and for which there may be a duty to disclose in accordance with 37 CFR 1.56.

The relevance of the attached references is that this is the closest art of which Applicant is aware.

Applicant submits that the above references taken alone or in combination neither anticipate nor render obvious the present invention. Consideration of the foregoing in relation to this application is respectfully requested.

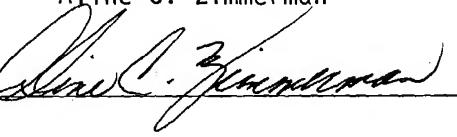
It is requested that the information disclosed herein be made of record in this application.

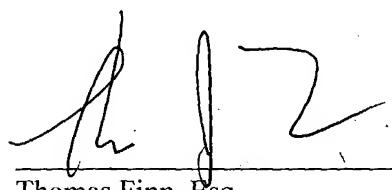
Respectfully submitted,

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Date of Deposit: 07/29/03

Typed Name: Aline C. Zimmerman

Signature: 

  
Thomas Finn, Esq.  
Attorney/Agent for Applicant(s)

Reg. No. 48,066

Date: 7/29/03

Telephone No.: (520) 794-7980

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Substitute for form 1449A/PTO				Complete if Known	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> <i>(use as many sheets as necessary)</i>				Application Number	
				Filing Date	
				First Named Inventor	Barkei et al.
				Art Unit	
				Examiner Name	
Sheet	1	of	4	Attorney Docket Number	02W102

U.S. PATENT DOCUMENTS

## FOREIGN PATENT DOCUMENTS

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3. Enter Office that issued the document, by the two-letter code (WIPO Standard ST 3).<sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST 16 if possible.<sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (use as many sheets as necessary)				Application Number	
Sheet	2	of	4	Filing Date	
				First Named Inventor	Barker et al.
				Group Art Unit	
				Examiner Name	
				Attorney Docket Number	02W120

OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS		
Examiner Initials*	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
	1	Weinstein, J.D. and K.G. Libbrecht, "Microscopic Magnetic Traps for Neutral Atoms", <u>Physical Review A</u> , The American Physical Society, Vol. 52, No. 5, November 1995, pp. 4004-4009.
	7	Nieto, Michael Martin, et al., "Dense Antihydrogen: Its Production and Storage to Envision Antimatter Propulsion", Los Alamos Report LA-UR-01-3760, December 12, 2001, pp. 1-12.
	8	Howell, Richard H., "The Future: Intense Beams", Chapter 10 in <u>Positron Beams and Their Applications</u> , Paul Coleman Ed., World Scientific Publishing Co., Singapore, 2000, pp. 307-322.
	9	Cassidy, D.B. and J.A. Golovchenko, "The Bose-Einstein Condensation of Positronium in Submicron Cavities", Chapter 6 in <u>New Directions in Antimatter Chemistry and Physics</u> , C.M. Surko and F.A. Gianturco, Eds., Kluwer Academic Publishers, Netherlands, 2001, pp. 83-99.
	10	Mills, Allen Paine, Jr., "Positronium Molecule Formation, Bose-Einstein Condensation and Stimulated Annihilation", <u>Nuclear Instruments and Methods in Physics Research B</u> , No. 192, Elsevier Science B.V., 2002, pp. 107-116.
	11	Platzman, P.M. and A. P. Mills, Jr., "Possibilities for Bose Condensation of Positronium", <u>Physical Review B</u> , Vol. 49, No. 1, 1 January 1994, pp. 454-458.
	12	Saito, Haruo and Toshio Hyodo, "Cooling and Quenching of Positronium in Porous Material", Chapter 7 in <u>New Directions in Antimatter Chemistry and Physics</u> , C.M. Surko and F.A. Gianturco, Eds., Kluwer Academic Publishers, Netherlands, 2001, pp. 101-114.
	13	Ackerman, J., et al., "Long-Lived States of Positronium in Crossed Electric and Magnetic Fields", <u>Physical Review Letters</u> , The American Physical Society, Vol. 78, No. 2, 13 January 1997, pp. 199-202.
	14	Schmelcher, P., et al., "Stabilization of Matter-Antimatter Atoms in Crossed Electric and Magnetic Fields", <u>Nuclear Instruments and Methods in Physics Research B</u> , No. 143, Elsevier Science B.V., 1998, pp. 202-208.
	15	Schertzer, "Positronium in Crossed Electric and Magnetic Fields: The Existence of a Long-Lived Ground State", <u>Physical Review A</u> , The American Physical Society, Vol. 58, No. 2, August 1998, pp. 1129-1138.
	16	Karlson, Antonella and Marvin H. Mittleman, "Stabilization of Positronium by Laser Fields", <u>Journal of Physics B</u> , Vol. 29, 1996, IOP Publishing, U.K., pp. 4609-4623.

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				Application Number	
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				Group Art Unit	
				Examiner Name	
Sheet	3	of	4	Attorney Docket Number	02W120

<b>OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS</b>				
Examiner Initials*	Cite <sub>1</sub> No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.		T <sup>2</sup>
	19	Wallen, P. and W.A. Mahoney, "The Positronium Radiative Combination Spectrum: Calculation in the Limit of Thermal Positrons and Low Densities", <u>The Astrophysical Journal</u> , Vol. 465, July 1, 1996, The American Astronomical Society, USA, pp. 473-486.		
	20	Baldwin, George C. and Johndale C. Solem, "Recoilless Gamma-Ray Lasers", <u>Review of Modern Physics</u> , Vol. 69, No. 4, October 1997, The American Physical Society, pp. 1085-1117.		
	25	Liang, Edison P. and Charles D. Dermer, "Laser Cooling of Positronium", <u>Optics Communication</u> , Vol. 65, No. 6, 13 March 1988, Elsevier Science Publishers B.V., pp. 419-424.		
	26	John, Sajeev and Jian Wang, "Quantum Optics of Localized Light in a Photonic Band Gap", <u>Physical Review B</u> , Vol. 43, No. 16, 1 June 1991, The American Physical Society, pp. 12 772-12 789.		
	27	John, Sajeev and Jian Wang, "Quantum Electrodynamics Near a Photonic Band Gap, Photon Bound States and Dressed Atoms", <u>Physical Review Letters</u> , Vol. 64, No. 5, 14 May 1990, The American Physical Society, pp. 2418-2421.		
	28	John, Sajeev and Tran Quang, "Photon-Hopping Conduction and Collectively Induced Transparency in a Photonic Band Gap", <u>Physical Review A</u> , Vol. 52, No. 5, November 1995, The American Physical Society, pp. 4083-4088.		
	29	John, Sajeev, "Quantum Optical Spin-Glass State of Impurity Two-Level Atoms in a Photonic Band Gap", <u>Physical Review Letters</u> , Vol 76, No. 8, 19 February 1996, The American Physical Society, pp. 1320-1323.		
	30	Quang, Tran, et al., "Coherent Control of Spontaneous Emission Near a Photonic Band Edge: A Single-Atom Optical Memory Device", <u>Physical Review Letters</u> , Vol 79, No. 26, 29 December 1997, The American Chemical Society, pp. 5238-5241.		
	31	John, Sajeev and Kurt Busch, "Photonic Bandgap Formation and Tunability in Certain Self-Organizing Systems", <u>Journal of Lightwave Technology</u> , Vol. 17, No. 11, November 1999, pp. 1931-1943.		
	32	Lin, Shawn-Yu and J.G. Fleming, "A Three-Dimensional Optical Photonic Crystal", <u>Journal of Lightwave Technology</u> , Vol. 17, No. 11, November, 1999, pp. 1944-1947.		
	33	Roundy, David and John Joannopoulos, "Photonic Crystal Structure with Square Symmetry with each Layer and a Three-Dimensional Band Gap", <u>Applied Physics Letters</u> , American Institute of Physics, Volume 82, No. 22, 2 June 2003, pp. 3835-3837.		

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				Filing Date	
				First Named Inventor	Barker et al.
				Group Art Unit	
				Examiner Name	
Sheet	4	of	4	Attorney Docket Number	02W102

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